

What is claimed is:

1. A photo-fabrication apparatus for performing three-dimensional fabrication by irradiating a photosensitive material with light, comprising:

5 a light source;

a spatial light modulator having a plurality of micromirrors arranged in a two-dimensional array, for spatially modulating light received from said light source by individually changing tilt angles of said plurality of micromirrors;

10 a holding part for holding a photosensitive material to be irradiated with light which is spatially modulated by said spatial light modulator; and

a controller for controlling tilt angles of said plurality of micromirrors to control a quantity of irradiation light for each of a group of irradiation regions on said photosensitive material among more than two levels, said group of irradiation regions corresponding to said plurality of micromirrors.

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2. The photo-fabrication apparatus according to claim 1, further comprising

a mechanism for changing a distance between a position where luminous fluxes going toward said group of irradiation regions are focused and a surface of said photosensitive material.

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3. The photo-fabrication apparatus according to claim 1, wherein

said controller comprises

a memory for storing shape data on a three-dimensional shape of an object and a table substantially indicating a relation between a quantity of irradiation light for one exposure region on a photosensitive material and an exposed depth of said photosensitive

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material; and

an electronic circuit for obtaining a quantity of irradiation light for each of exposure regions defined on said photosensitive material, which is an element of exposure, on the basis of said shape data and said table.

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4. The photo-fabrication apparatus according to claim 3, further comprising a measuring device,

wherein a plurality of exposure regions are irradiated with light of different exposure values and said measuring device measures heights of a photosensitive material which is developed after irradiation, at said plurality of exposure regions, and

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said controller makes said table on the basis of said exposure values and said heights of photosensitive material at said plurality of exposure regions.

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5. A photo-fabrication apparatus for performing three-dimensional fabrication by irradiating a photosensitive material with light, comprising:

a spatial light modulator for generating spatially-modulated light;

a holding part for holding a photosensitive material to be irradiated with light which is spatially modulated by said spatial light modulator;

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a moving mechanism for moving a group of irradiation regions on a photosensitive material relatively to said photosensitive material, each of said group of irradiation regions corresponding to an element of modulation; and

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a controller for controlling said spatial light modulator in synchronization with a relative movement of said group of irradiation regions to control a cumulative quantity of irradiation light emitted to each of exposure regions defined on said photosensitive material among more than two levels while a plurality of irradiation regions pass said

each of exposure regions.

6. The photo-fabrication apparatus according to claim 5, wherein
said group of irradiation regions are arranged in a two-dimensional array and a
5 relative movement direction of said group of irradiation regions goes almost along one
array direction.

7. The photo-fabrication apparatus according to claim 6, wherein
said group of irradiation regions are arranged at regular intervals in two
10 directions which are orthogonal to each other and a distance in a direction orthogonal to
said relative movement direction between irradiation regions on both ends in a row along
said one array direction is smaller than a pitch of said group of irradiation regions in the
other array direction.

15 8. The photo-fabrication apparatus according to claim 5, wherein
said spatial light modulator has a plurality of micromirrors and spatially
modulates light received from a light source by individually changing tilt angles of said
plurality of micromirrors.

20 9. The photo-fabrication apparatus according to claim 5, further comprising
a mechanism for changing a distance between a position where luminous fluxes
going toward said group of irradiation regions are focused and a surface of said
photosensitive material.

25 10. The photo-fabrication apparatus according to claim 5, wherein

said controller comprises

a memory for storing shape data on a three-dimensional shape of an object and a table substantially indicating a relation between a quantity of irradiation light for one exposure region on a photosensitive material and an exposed depth of said photosensitive material; and

an electronic circuit for obtaining a quantity of irradiation light for each of exposure regions defined on said photosensitive material, which is an element of exposure, on the basis of said shape data and said table.

10 11. The photo-fabrication apparatus according to claim 10, further comprising a measuring device,

wherein a plurality of exposure regions are irradiated with light of different exposure values and said measuring device measures heights of a photosensitive material which is developed after irradiation, at said plurality of exposure regions, and

15 said controller makes said table on the basis of said exposure values and said heights of photosensitive material at said plurality of exposure regions.

12. A photo-fabrication apparatus for performing three-dimensional fabrication by irradiating a photosensitive material with light, comprising:

20 a light source unit for emitting modulated light;

a holding part for holding a photosensitive material to be irradiated with light from said light source unit;

a moving mechanism for moving an irradiation region irradiated with light emitted from said light source unit relatively to a photosensitive material; and

25 a controller for controlling said light source unit in synchronization with a

relative movement of said irradiation region to control a cumulative quantity of irradiation light for each of exposure regions defined on said photosensitive material among more than two levels.

5 13. The photo-fabrication apparatus according to claim 12, further comprising
a mechanism for changing a distance between a position where a luminous flux
going toward said irradiation region is focused and a surface of said photosensitive
material.

10 14. The photo-fabrication apparatus according to claim 13, wherein
said controller comprises
a memory for storing shape data on a three-dimensional shape of an object and a
table substantially indicating a relation between a quantity of irradiation light for one
exposure region on a photosensitive material and an exposed depth of said photosensitive
15 material; and

an electronic circuit for obtaining a quantity of irradiation light for each of
exposure regions defined on said photosensitive material, which is an element of exposure,
on the basis of said shape data and said table.

20 15. The photo-fabrication apparatus according to claim 14, further comprising
a measuring device,
wherein a plurality of exposure regions are irradiated with light of different
exposure values and said measuring device measures heights of a photosensitive material
which is developed after irradiation, at said plurality of exposure regions, and
25 said controller makes said table on the basis of said exposure values and said

heights of photosensitive material at said plurality of exposure regions.